Audio, data and contacts over IP networks

E351 - Network audio and data transceiver

EQUITEL

This document is the E351 unit technical reference. This unit allows the transmission of audio, data and contacts over IP networks.

The present edition of this document is valid for the following E351 versions:

- o *Hardware version: V102*
- o *Firmware version: V_E_3.8*

E351 Technical manual

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Chapter 1 Description

1.1 Description and functionality

E351 is a single channel high quality audio, single channel asynchronous serial data and eight ON / OFF contacts transceiver over IP networks.

This equipment has been specially designed for PA systems over IP networks. It can be used as well with intercom systems, access control, tunnels and, in general, in those installations where the transmission of high quality audio, serial data or contacts is required.

The most important characteristics of the system are as follows:

- Transmission and reception of one high quality audio signal (20-20000 Hz bandwidth, SNR >70 dB).

- Reception of up to 5 prioritized audio streams.

- One configurable RS-232, RS-422 or RS-485 serial data channel

- 8 input and output dry contacts.

- Possibility of sending the audio, serial data and contacts to up to 5 different destinations at the same time via unicast transmission or to multiple destinations via multicast.

- Easy configuration via Web server or Telnet.

- Additional software for the equipments configuration and control available.

- Internal firmware update through the Ethernet network.

- Highly robust: Operating temperature range from -40 to 74 ºC.

- Power supply range: from 12 to 24 Vdc.

- Consumption: less than 5 W.

- Different formats available: for rack mounting, stand-alone or DIN rail.

The following figure depicts a general system block diagram:
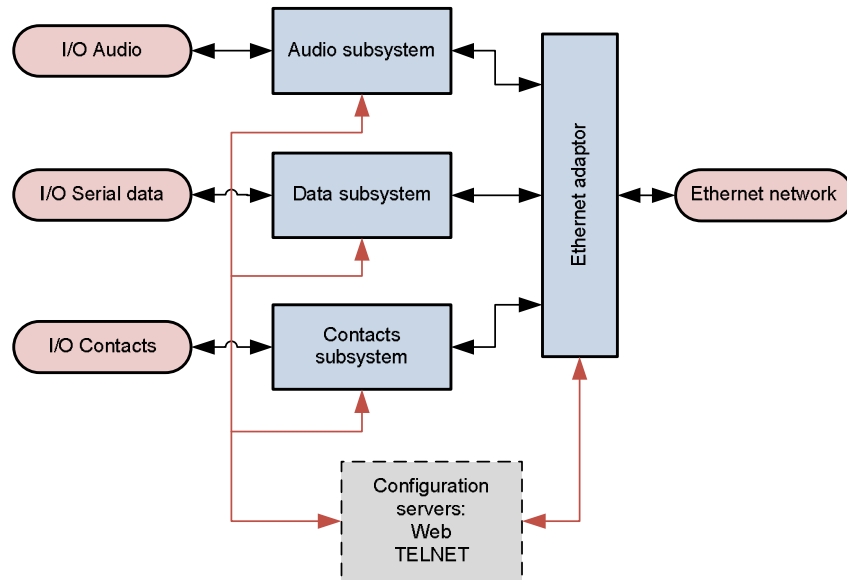
Figure 1: E351 block diagram

There are three subsystems within the E351 unit that operate almost independently one from each other: audio, serial data and contacts.

The three subsystems share the same Ethernet connection and the same configuration servers.

The audio subsystem contains five data receivers (servers), each one able to associate to a multicast group, and five transmitters (clients).

The serial data and contacts subsystems have one Ethernet data receiver each one (server) with capacity to associate to a multicast group, and five transmitters (clients) for sending the data to up to 5 different destinations at the same time.

The communication can be made either with other E351 units or with other systems: computers or other equipments connected to the Ethernet network.

The communication protocols used are standard in some cases (such as audio) but sometimes they are proprietary of EQUITEL.

Should it be necessary, EQUITEL may supply a software development kit (SDK) with the necessary technical documentation (for example, in order to integrate E351 in management systems such as SCADA). If so, you may apply for it through our sales department or the email support@equitel.es.

EQUITEL also supplies the applications "EQUITEL Devices Searcher" which is useful to locate the different Equitel units within an Ethernet network, and "E351 Control Demo", a demo application for controlling several E351 and send audio from a PC.

Likewise, EQUITEL can develop custom-made control applications following the customers' needs.

1.2 Sample applications

Please find below two possible examples where our systems can be used:

The following figure depicts a system composed by a PC transmitting to several zones controlled by the E351:
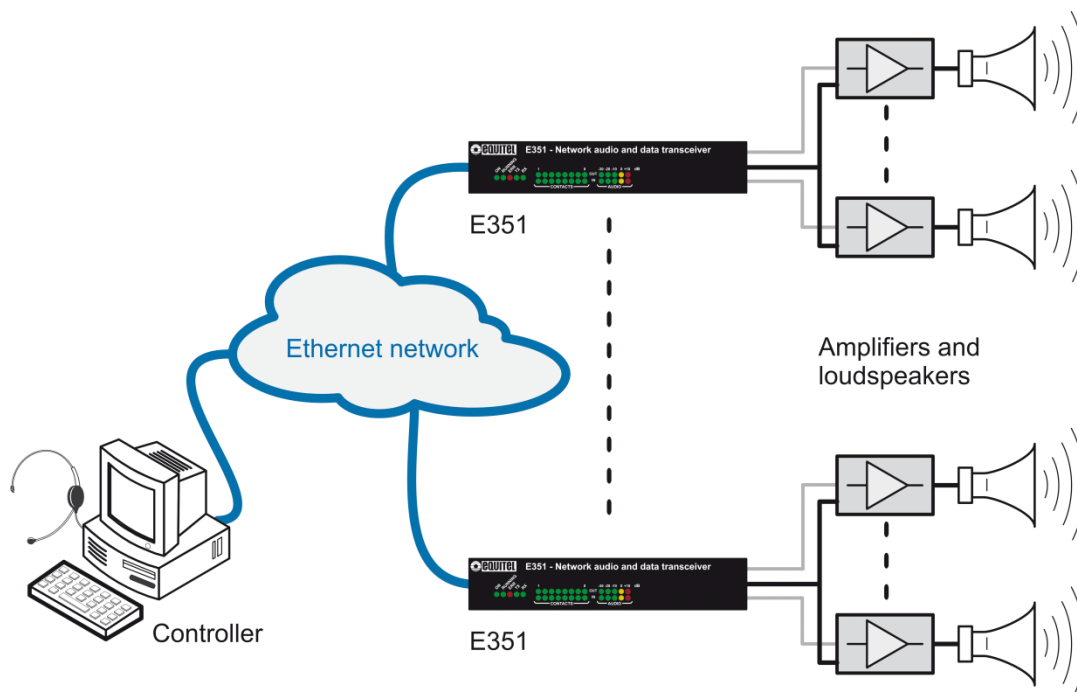
Figure 2: Transmission from a PC to several equipments and zones

In this case, the PC must run software capable of communicating with the equipments for its management (zones activation control using contacts or serial port) and for sending audio.

In the following figure it is shown a system composed by several E351 with bidirectional communication among all of them:
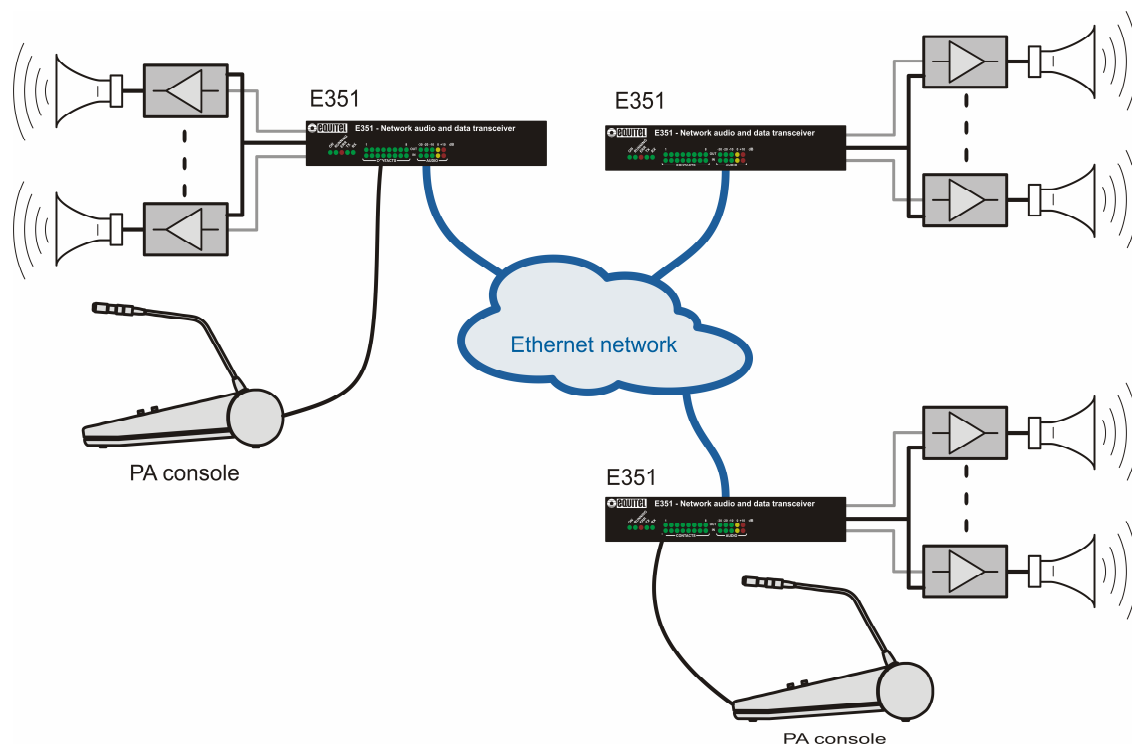
Figure 3: Bidirectional transmission and to different zones

In this case, once the equipments are properly configured, the communication is established directly between them automatically.

1.3   System components

The most important components of the system are shown below:
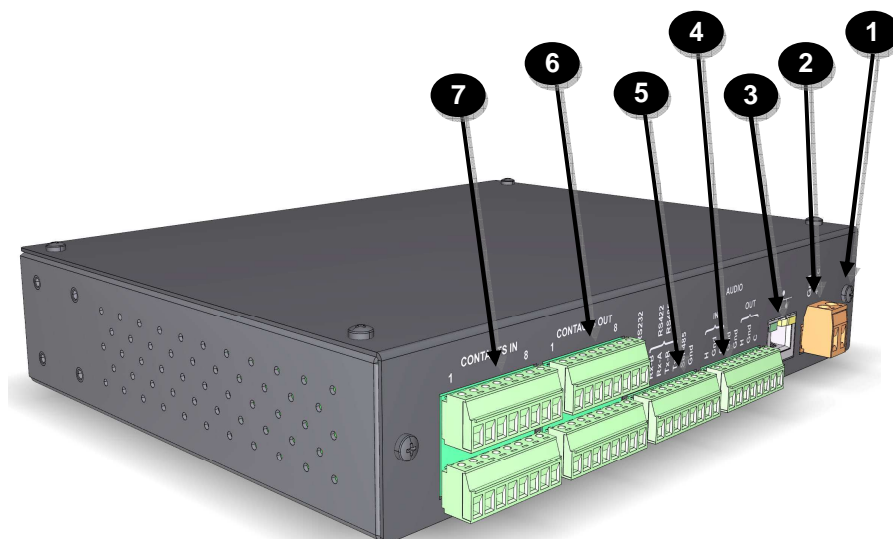
Figure 4: E351 rear view
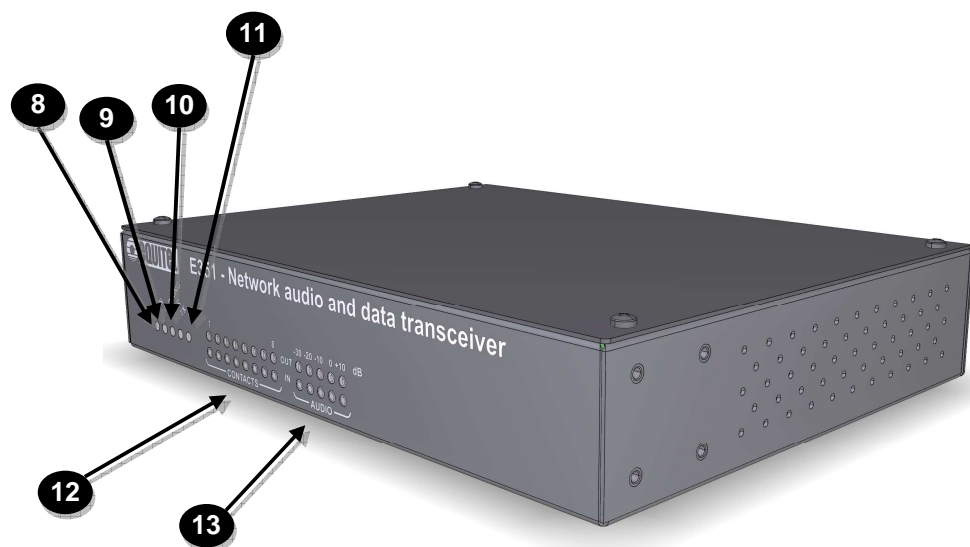
Figure 5: E351 front view

Element	Description
1	Reset and factory configuration recovery button
2	Power connector
3	Ethernet connector
4	Audio connector
5	Data connector
6	Output contacts connector
7	Input contacts connector
8	ON LED
9	RUN LED
10	ERROR LED
11	Data operation indicator LEDs
12	Contacts operation indicator LEDs
13	Audio operation indicator LEDs

Chapter 2   Operation

2.1   Power

The E351 module is designed to be powered by a DC power supply between 12 and 24 volts, capable of supplying a minimum of 5 watts.

The power supply has to be plugged to connector ❷. As a protection measure, the unit has an internal 2 amp fuse.

When the equipment is properly powered, the indicator "ON" should flash (see section 2.8)
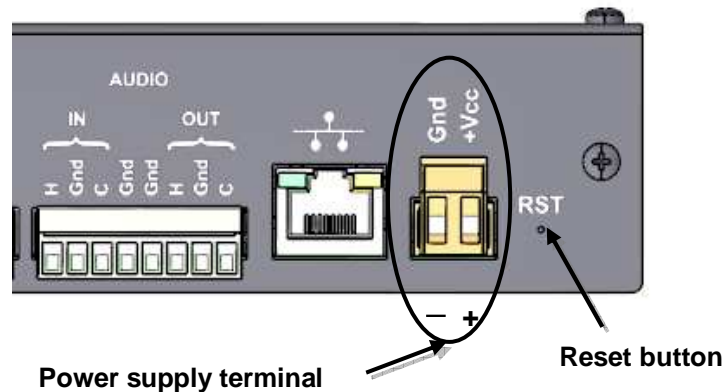
Figure 6. Power and Reset

2.2   Reset

The unit has a reset button hidden in the rear part ❶ with two functions: reset the unit and revert the factory default configuration.

To access the internal button, you can use a small screw-driver or even a paperclip could do.

To reset the unit it is necessary to press it for a few seconds.

To restore the default factory configuration, please keep it pressed for more than 5 seconds.

2.3   Ethernet connection

E351 has a 100 BASE T Ethernet port with MDI configuration but without auto-MDIX support.

The MDI configuration is the usual one in final equipments such as PCs, etc. In order to connect the E351 to a switch / hub you can use a direct cable. However, should it be required to connect it directly to a computer, it will be necessary a cross-over one.

The Ethernet connector ❸ is a RJ45 jack (see pin-out in the section 6.5). This connector has two line activity indicator LEDs (yellow) and connection rate (green).

2.4   KeepAlive

In TCP connections we have implemented a KeepAlive mechanism to avoid the socket to remain "half-open" in case of losing the connection with the remote end without having closed the socket properly (for example, when turning off the remote unit or a failure in the Ethernet network).

This KeepAlive is at the TCP layer level. On the other hand, it is the TCP/IP stack of the machine we are using who handles the communication. This way, the user must not intervene since it allows the connection to the unit from a PC without the need of adding further control packets to the application.

The KeepAlive packets are TCP packets with null data, with 60 bytes length and low-bandwidth consuming.

This mechanism is implemented in the TCP server side. KeepAlive packets are sent when the connection is in idle state. If the ACKs corresponding to these packets are not received after some time, the socket is closed. This will allow a later connection to this server; otherwise, if the socket remained open, it would be impossible to establish a connection till rebooting the equipment.

There three times controlling the KeepAlive functioning:

- Idle (this is the time in idle state, which is 10000ms by default.

- Interval (5000 ms by default).

- Maxidle (maximum time in idle state; 60000 ms by default).

When the server detects that there has been no connection activity for a while (Idle), it sends a KeepAlive packet. Should it not receive the corresponding ACK, it keeps resending it regularly every configured time (Interval) until the ACK is received, or until the maximum time in idle state is reached. In this moment, the socket is closed.

These parameters have the above mentioned values by default but its configuration can be changed via Telnet. Choosing these values has an impact in the bandwidth, failures in the Ethernet network and how fast the "half-open" connection is detected.

- Bandwidth: The higher the "Idle" time, the lower the bandwidth consumption since in normal circumstances, this is the time we are going to use.

- Network failures: The lower the MaxIdle time, the lower the time E351 will take in detecting that the other end has failed and consequently close the connection. However, if this time is very small and there is any failure in the network, the unit might close the connection without the client having really closed the socket.

- Network failures causing "intermittent" packet losses: the lower the resend interval the higher the reliability, although the bandwidth will increase in turn.

2.5 Audio

E351 has a high quality bidirectional balanced audio signal, which is transmitted over IP networks according to the following block diagram:
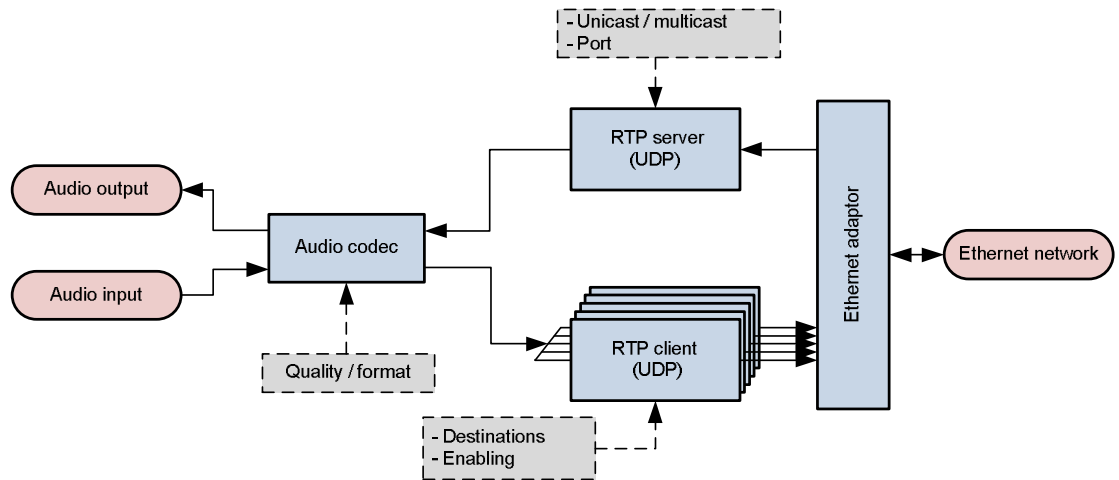
Figure 7: Block diagram of the audio subsystem

The analogue audio signal is converted to digital and vice versa in the codec, which can be configured in any of the three following qualities and formats:

- PCM-law A, sampled at 8 KHz, 8 bits per sample (64 Kbps). Corresponds to the ITU-G711 standard, which is the usual one in IP telephony. It offers a bandwidth between 300 and 3000 Hz and a signal to noise ratio higher than 61 dB.

- PCM sampled at 32 KHz, 16 bits per sample (512 Kbps). Bandwidth: 20 to 16000 Hz. Signal to noise ratio: ≥ 74 dB.

- PCM sampled at 48 KHz, 16 bits per sample (768 Kbps). Bandwidth: 20 to 22000 Hz. Signal to noise ratio: ≥ 74 dB

In the audio receiver part, E351 has 5 RTP servers, each one with a priority level and with configurable reception ports. This allows the reception of up to 5 different audio streams but it will be played the one with the highest priority.

It is possible to configure a multicast group for each one of the reception streams. This way, several E351 units can receive and decode the same audio stream.

In the transmission side there are up to 5 RTP clients, one for each one of the possible destinations. It is possible to configure the IP address, destination port and audio transmission activation method for each one of them.

The audio transmission to each destination can be forced: we can enable or disable it permanently; it is also possible to enable it once the input audio level reaches a certain threshold (which is configurable) or with the activation of any of the 8 input contacts.

The audio interface has two rows of LEDs (one for the audio input and another one for audio output) indicating the signal level. The former flash when the input audio is being sent to any of the destinations. The output leds flash when they receive audio over Ethernet and it is sent onwards the analogue output.

The audio connection is made through the connector ❹ (see pin-out in 6.6)

The audio input allows a maximum line input of +10dBu, being the input impedance of 600 Ω. The output is low impedance (33 Ω)

The connection of the balanced audio must be made with a two shielded conductors cable, as per Figure 8.
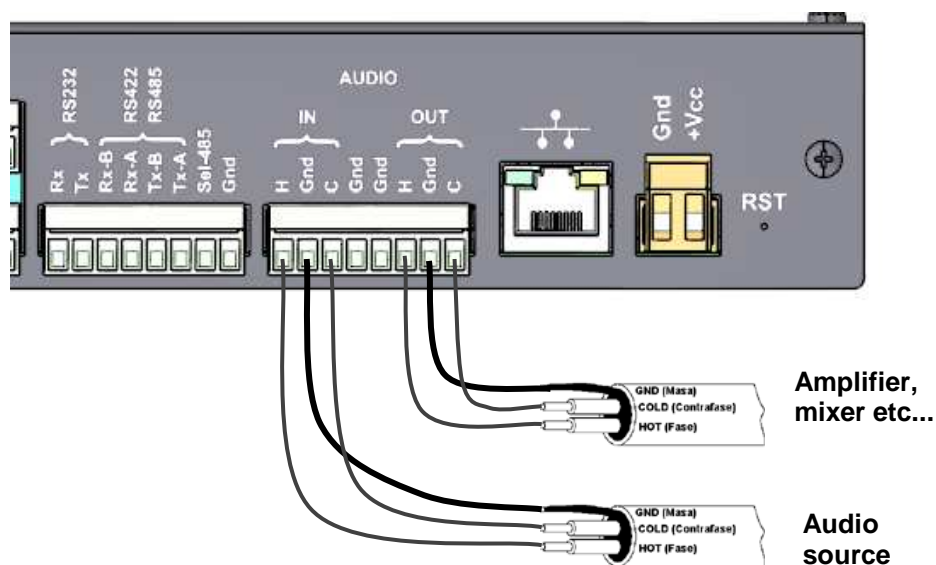
Figure 8. Audio cables connection

2.6 Serial data

E351 offers an asynchronous serial data channel, configurable in RS-232, RS-422 or RS-485 (2 or 4 wired), routed through / from the Ethernet interface as shown in the following block diagram:
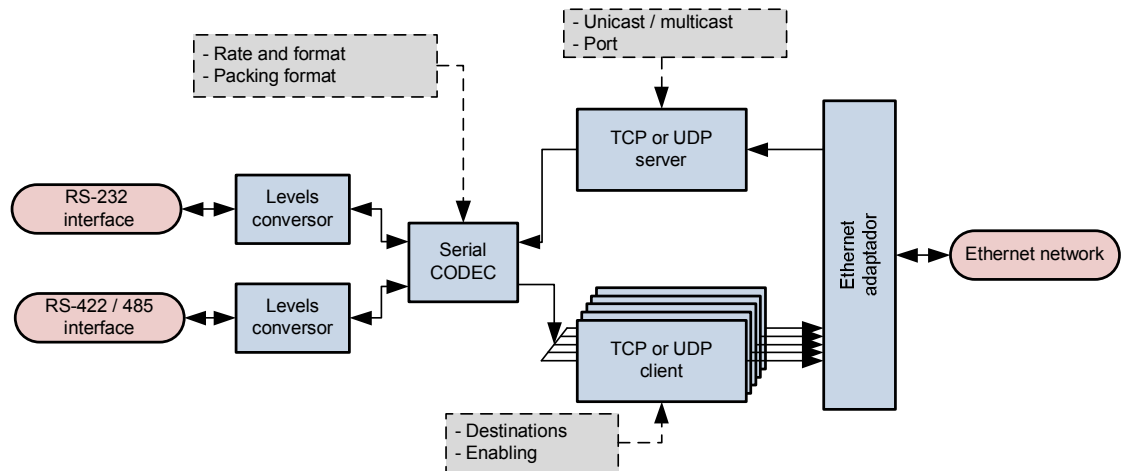
Figure 9: Serial data subsystem diagram block

The unit serial data connectors accept all the interfaces. Using one or another is decided with the cabling, as shown in chapter 2.6.1.

The codec makes the conversion between the data and the Ethernet packets. This codec can be parameterized with the following values:

- Binary transmission rate: Configurable with the following values: 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 Kbps

- Number of bits (6, 7 or 8), number of stop bits (1, or 2) and parity (not used, odd, even, marked or spaced).

- Packing form: one IP packet can be sent for every read bit in the serial port. Also, the read data can be stored in a buffer and they will be sent once they have reached a selected size, or after a specific time has passed by without receiving any data.

The E351 unit has a TCP/UDP server for the serial data reception. It is possible to configure the type of client (E351 or PC). If the client is another E351, the unit will simply send the received data from the serial port. However, if the client is a PC, it will also transmit the input serial port data to the client allowing a bidirectional communication through the same port in case of using HyperTerminal-type applications.

As for transmission, it has up to 5 TCP/UDP clients, one for each one of the possible destinations. The serial port input data are packed in a TCP packet in case of transmission to a unicast address, or UDP in case multicast transmission.

The LED TX will flash while the data is being transmitted over Ethernet, and so will the RX during reception.

2.6.1. Type of interface configuration

The type of serial interface selection is made when cabling the unit as shown below:

RS-232 interface:

Three wires are used: GND, Tx and Rx.

The data enter in the unit through the line Tx, and come out through the line Rx.
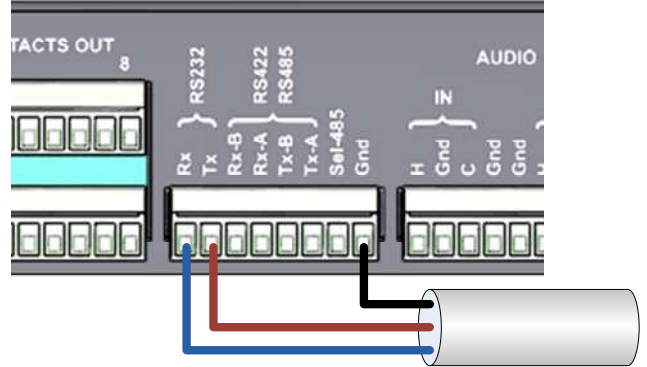
RS-422 interface:

Four wires are used:

Rx-A and Rx-B are the output pair.

Tx-A and Tx-B are the input pair.

In both cases, "A" line has a negative voltage relative to "B" line in standby mode.
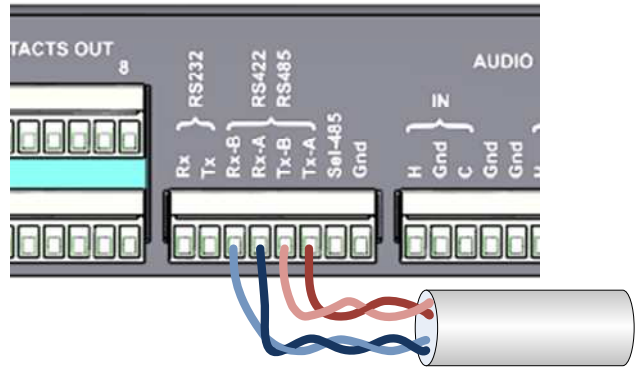
RS-485 interface (4w):
The connection is made like with RS-422. Furthermore, "Sel-485" must be joined with "Gnd".
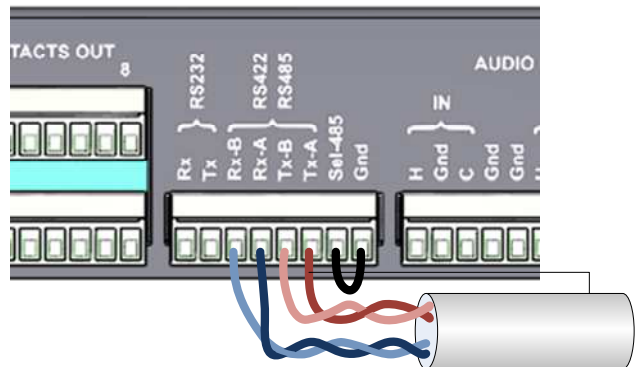
RS-485 interface (2w):

Lines Rx-A and Tx-A must be joined and, on the other side, Rx-B with Tx-B.

This way we obtain the only pair of wires necessary for the communication in this mode.
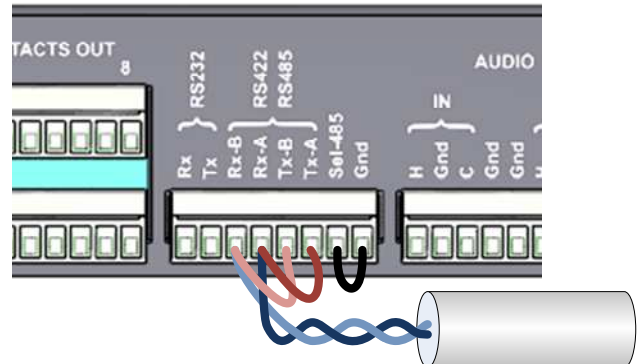
Very important note:

The correct configuration of a RS-485 (2 or 4 wire) data bus requires the presence of pull up / down resistors and, sometimes, line termination ones.

E351 has a socket where these resistors can be easily placed. Their location is shown in the following images:
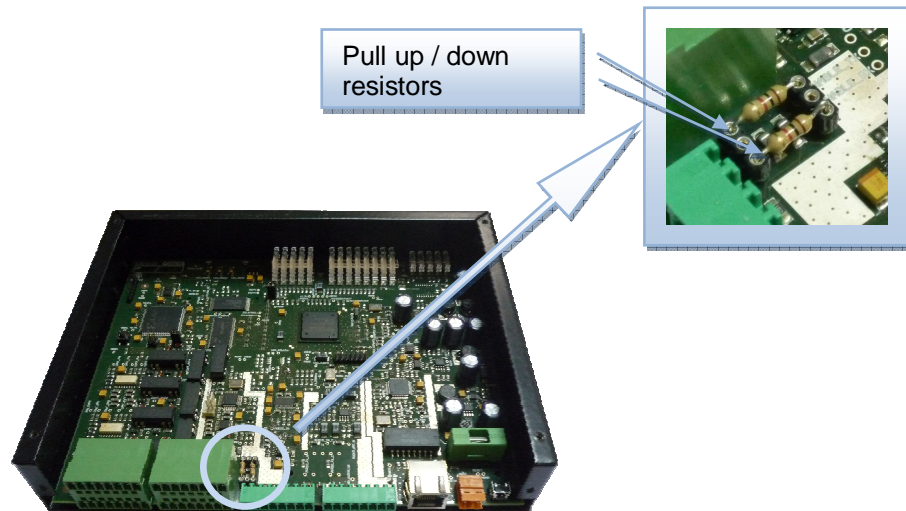
Figure 10: Socket location for RS-485 bus resistors

The unit has two 1 KΩ pull up / pull down resistors by default, as the picture shows.

Should it be necessary to install a line termination resistor, it can be placed between the two free terminals in the socket.

The use of these resistors and how to calculate their value is not the goal of this manual.

The document "RS-485 2-wire: connection guide" offers a detailed explanation about how to obtain the values of these resistors.

This document can be obtained through our web site (www.equitel.es). You may also ask for it by email to support@equitel.es or contact with our sales department.

2.7   Contacts

The E351 unit has 8 inputs and 8 dry contact outputs whose status is sent and received via the IP network:
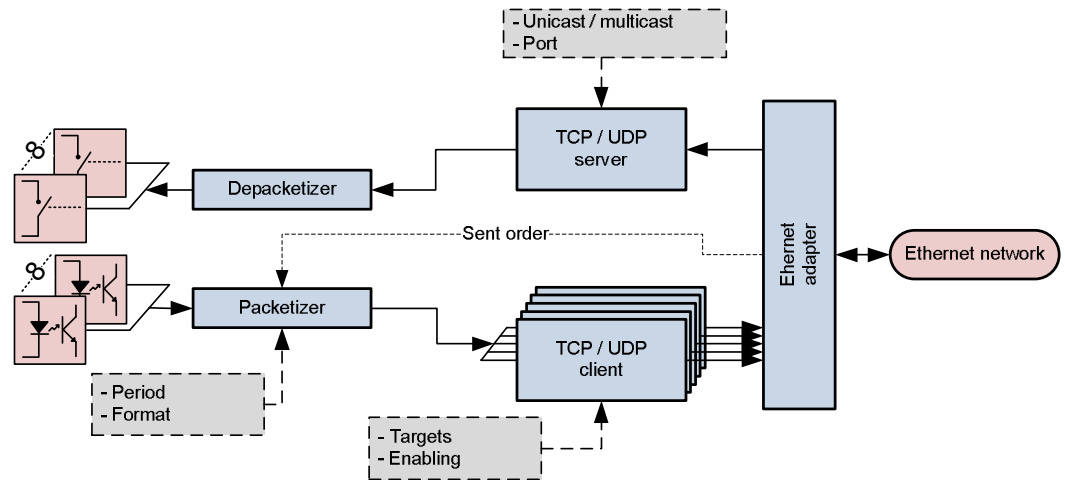
Figure 11: Contacts subsystem diagram block

A TCP/UDP server is available for the outputs contacts state reception and up to 5 TCP/UDP clients for the inputs contacts state transmission. When the communication is unicast we use the protocol TCP. However with multicast the transmission is with the UDP protocol.

The IP packets with the state of the contacts can be sent periodically, or when there is a change in any of the contacts, or upon request.

Furthermore, in the transmitted packet it is possible to configure the information that we want to send: we can decide whether to inform about all the contacts state or only one of them. In the latter case, and if it is configured so that they are allowed to transmit only when changing their status, it will be transmitted only the state of the contact that has changed.

As indicated in chapter 2.5, the input contacts can be used to activate or deactivate the audio transmission.

The output contact can also be used as a warning signal in case of Ethernet connection failure.

The contacts interface has two rows of LEDs: one is for the input contacts and the other one is for the output ones. Each LED indicates the state of one of the contacts, and lights when the contact is closed.

The input contacts are found in the connector ❼. In the following figure, the input circuit scheme and the correspondence with the connector terminals is depicted:
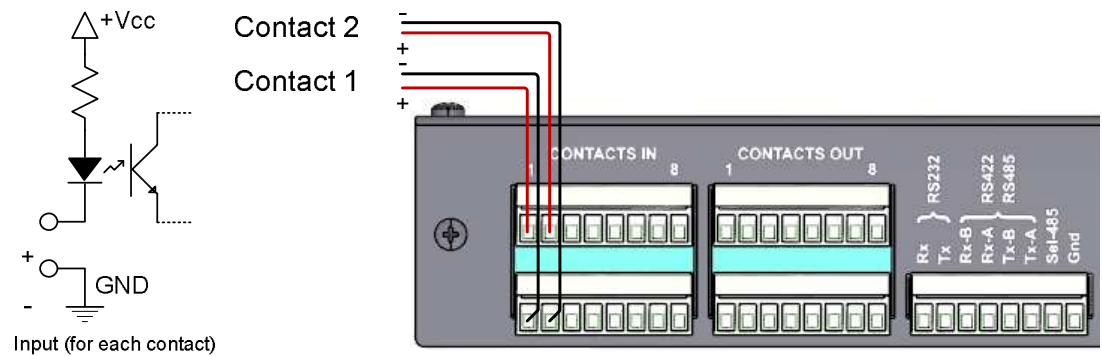
Figure 12: Input contacts schematic and location in the connector

The output contacts are dry between each column connector upper and lower terminals[6], as shown in the figure:
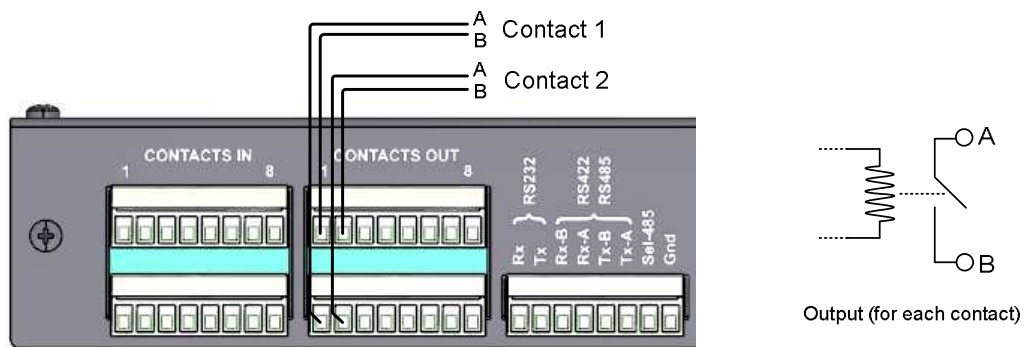
Figure 13: Output contacts schematic and location in the connector

Each contact supports a maximum voltage of 100 V and a maximum current of 0.5 A. However, the contact power must not exceed 10 VA.

2.8   Indicator LEDs
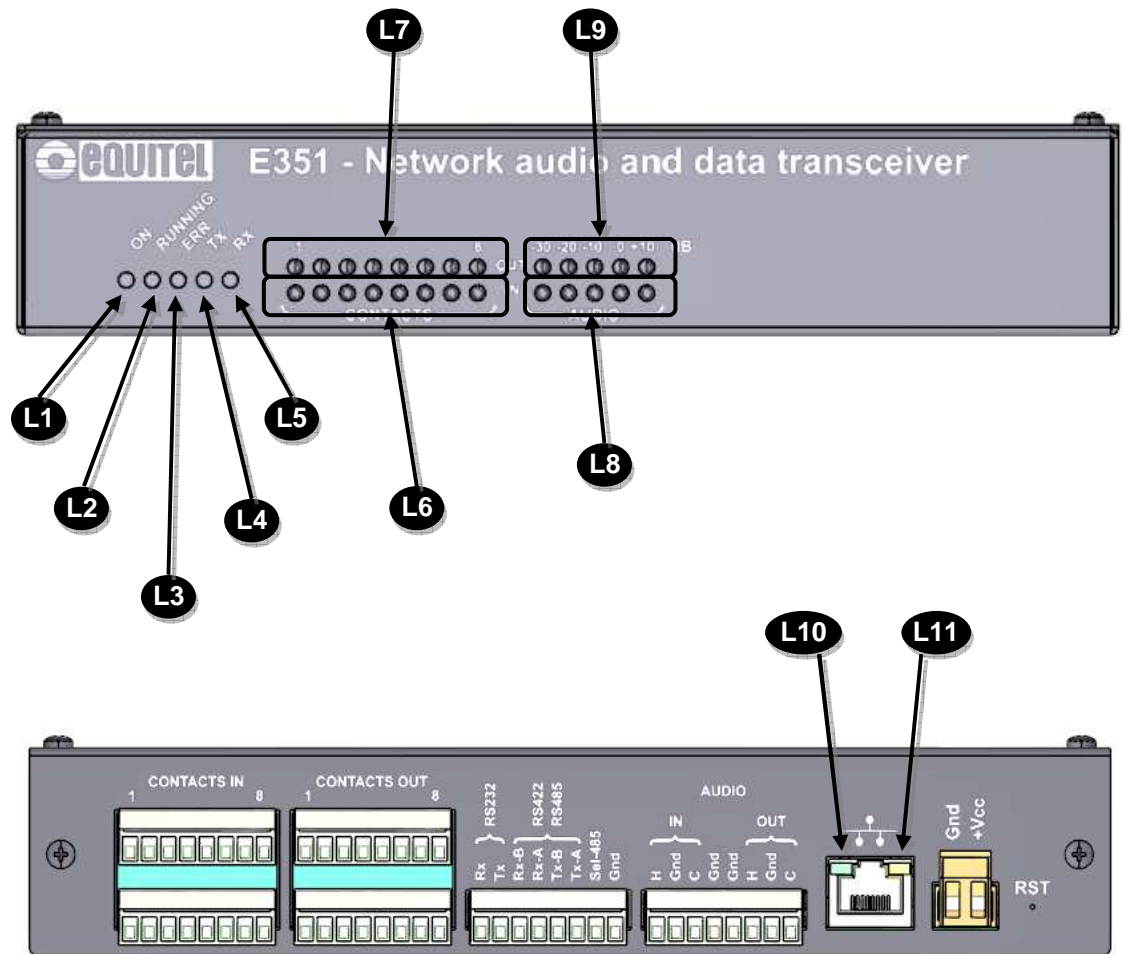
Figure 14: Indicator LEDs

L1 ON (green): The module is being powered.

L2 RUN (green): The module is in operation.

> Blinking: The operation is normal, software is running correctly.

L3 ERR (red): error.

> Blinking: (2 seconds) error in audio, the received audio format does not correspond with the one configured in the equipment.

> Blinking: (1 second) Firmware update. When the updated is finished it remains fixed for 20 seconds.

> Fixed: error in the firmware update or in the network connection.

L4 TX (green): serial data transmission over Ethernet

L5 RX (green): serial data reception from Ethernet

L6 CONTACTS – IN (8 green): input contacts state. They light when closed.

L7 CONTACTS – OUT (8 green): output contacts state. They light when closed.

L8 AUDIO – IN (3 green, 1 yellow, 1 red): input audio level (dB)

Red: excess input signal (≥ 10dB)

L9 AUDIO – OUT (3 green, 1 yellow, 1 red): output audio level (dB)

Red: excess output signal (≥ 10dB)

L10 LINK (yellow): activity in the Ethernet network

L11 SPD (green): rate in the Ethernet network

Lit: 100 BASE-TX

Chapter 3   Configuration using the web server

There are two ways of configuring the E351 module:

- Via an integrated web server. This will be explained in this Chapter.
- Via telnet through a line commands interface explained in Chapter 4.

E351 has an integrated web server (port 80) that allows accessing the configuration parameters from any standard http browser (Microsoft Internet Explorer, Google Chrome, Mozilla, Opera, Safari etc.)

After modifying any of the configuration parameters it is necessary to save the changes in the memory. In order to do so, please click on the 'Apply' button, and the module will automatically restart with the new parameters. It must be taken into account that it will take a few seconds to connect the unit again due to the time it takes to reboot.

To access the web server, open a browser and type the module IP address.

> By default, the units are factory configured with the IP address: 192.168.1.1

A new window will open requiring the user name and the password to access this server.

> By default: User name: User
> Password: 1234

When entering the server we will see a window as the one in Figure 15: this is E351 home page.

Figure 15: E351 web server home page

On the left side there is a menu with links to the different configuration pages: "Audio", contacts ("Digital I/O") and serial data ("Serial I/O"); also the "Reboot" page to reboot the unit from a remote point; "Security" to modify the user and access password and "Status" where we have information about the audio, data and contacts status.

In this window we can configure an output contact to be activated (closed) when there is an error in the Ethernet connection of the unit. After modifying this configuration it is saved automatically in the Flash.

3.1   Network configuration
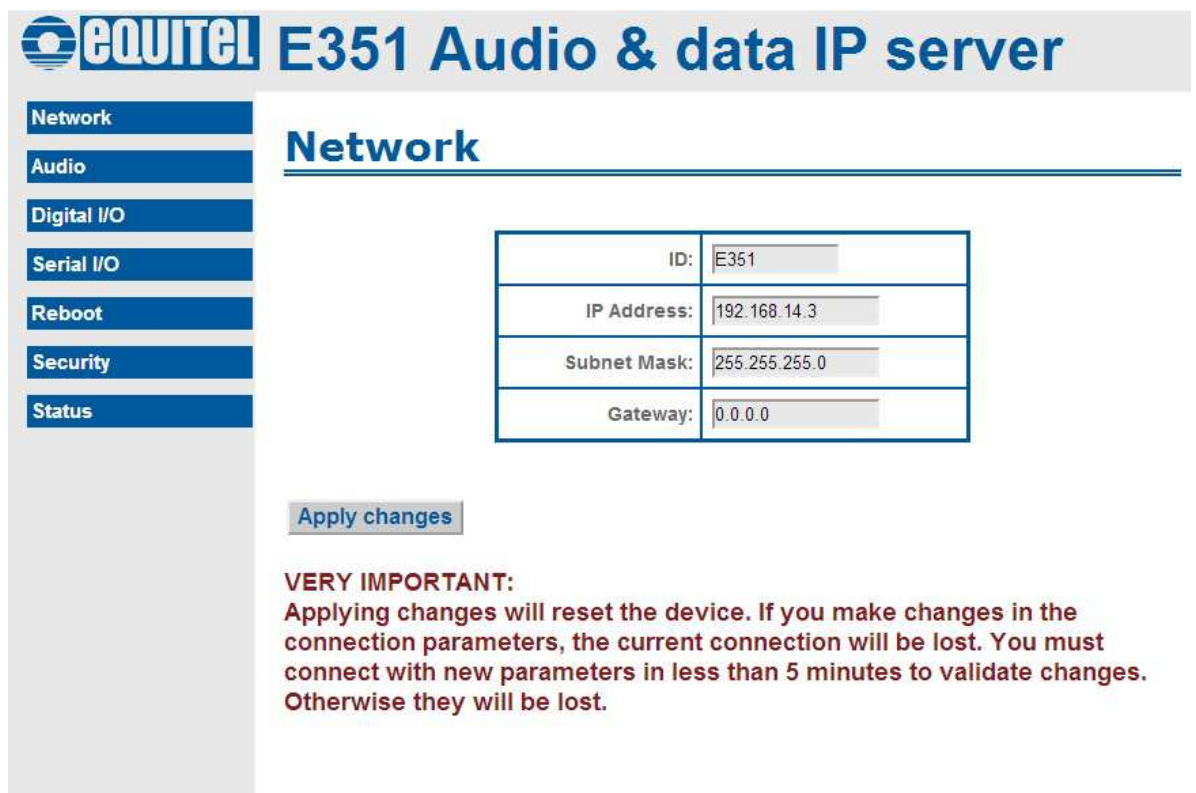
The home page enters directly to the network configuration page (Figure 15). The current values of the network parameters are shown here (name of the unit, IP address, subnet mask, Gateway, MAC address).

The factory configuration default is:
E351_ID: E351
IP address: 192.168.1.1
Subnet mask: 255.255.255.0
Gateway: 0.0.0.0

To change any of these parameters press the button 'Change Network Configuration'. When the changes have been made we have to click on the button "Apply Changes" to save this configuration.

Afterwards the unit resets and it comes back to a page for confirming the changes made in the network configuration.

Figure 16: Confirmation of the changes in the network configuration

If there is typing mistake when introducing the new network parameters, the connection with the equipment might not be possible. E351 has a security system to avoid that. After modifying the network parameters we have to make a connection with the unit within 5 minutes and accept the new configuration by clicking the 'Accept changes' button. If this step is not taken, after 5 minutes the unit will recover the former network configuration parameters.

3.2 Audio configuration

Through this window configuration page, Figure 17, we can configure the quality and audio reception and transmission parameters.

Figure 17: Audio configuration window

Audio quality:

Quality: PCMA audio at 8 KHz, 8 bits/sample (64 Kbps) | PCMA audio at 32 KHz, 16 bits/sample (512 Kbps) | PCMA audio at 48 KHz, 16 bits/sample (768 Kbps)

Reception Buffer:

Rx Buffer Size: Reception buffer size to absorve the network delays. Audio begins to

play when the buffer is half-filled.

Transmission threshold:

We can configure the audio transmission to be activated only when the input audio level is higher than a threshold previously established.

Power:	Audio input threshold above which the transmission is activated. Possible values: -60dB... +10dB
Activation Time:	Minimum time the input audio must remain above the threshold level to begin transmitting. Possible values: 20.. 5000 ms (multiple of 20)
Deactivation Time:	Minimum time the input audio must remain below the threshold level to stop transmitting. Possible values: 20.. 5000 ms (multiple of 20)

Reception parameters:

There are 5 input channels in which we can receive audio packets. For each one we configure:

Priority:	It indicates the audio reception channel priority. The highest priority stream received will be sent to the audio output.
Mode:	Selects the type of reception (multicast or unicast). In case of multicast it will be shown the box 'Multicast Group' to introduce the multicast group to which we want to subscribe.
Multicast Group:	Multicast group IP address to which you wish to register: Possible values: 224.0.0.0 ··· 239.255.255.255
Port Multicast:	RTP audio packets reception port for multicast reception. Possible values: 0 ··· 65535 (even number).

Transmission parameters:

There are 5 possible destinations to which the audio packets can be sent. For each one, the following parameters must be configured:

IP address:	Audio destination IP address. It can be either a multicast or unicast address.
Port:	RTP audio destination port. Possible values: 0 ··· 65535 (even number)
Activation:	Enabling or disabling mode for sending the packets Possible values: OFF | ON | By audio level | By digital input X OFF: Transmission disabled ON: Transmission enabled By Audio Level: Packets are transmitted according to the parameters configured in the section 'Tx Activation Level Threshold'. By Digital Input X: Packets are transmitted when the input contact is activated (closed).
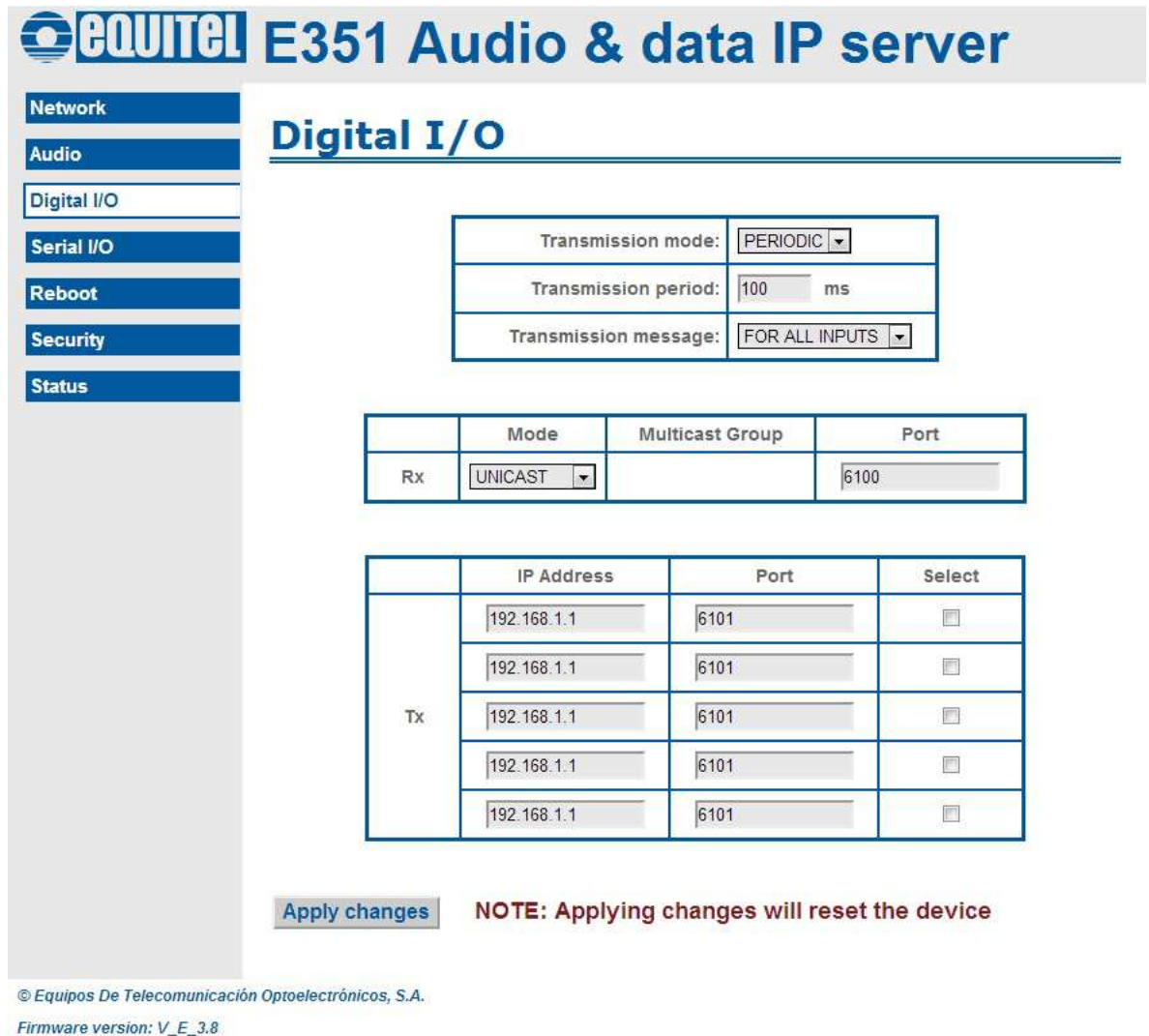
The RTP port must be an even number (the odd port besides it is reserved for the RTCP protocol)

3.3   Contacts configuration

In the contacts configuration window (Figure 18), we can configure the transmission mode, as well as the contacts reception and transmission parameters.

Figure 18: Contacts configuration window

Transmission mode:

Type: Transmission mode required:

Possible values: PERIODIC | CHANGE | ORDER

PERIODIC: The inputs state is sent periodically according to the intervals specified in the field "Period".

CHANGE: The inputs state is sent only when there is a change in one of them.

ORDER: The inputs state is sent only when required.

Period: Transmission period of the contacts state. It is taken into account only when the periodic transmission type has been selected.

Possible values: 1 ⋯ 9999 (ms)

Message: Form in which the information is packed.

Possible values: 1 FOR ALL CONTACTS | 1 FOR EACH CONTACT

1 FOR ALL CONTACTS: A single packet with the state of all the inputs is sent.

1 FOR EACH CONTACT: One packet for each one of the inputs is sent.

Reception parameters:

Mode: Selection of the desired reception type, Unicast or Multicast. In case of choosing Multicast, it will be shown the box 'Multicast Group' in which we have to type the multicast group to which we want to subscribe.

Multicast Group: Multicast group IP address to which you would like to subscribe to:

Possible values: 224.0.0.0 ⋯ 239.255.255.255

Port: Contacts status packets reception port.

Possible values: 0 ⋯ 65535

Transmission parameters:

There are 5 possible destinations to which the contacts state packets can be sent. For each one, it must be configured as follows:

IP address: Packets destination IP address. It can be either a unicast or multicast address.
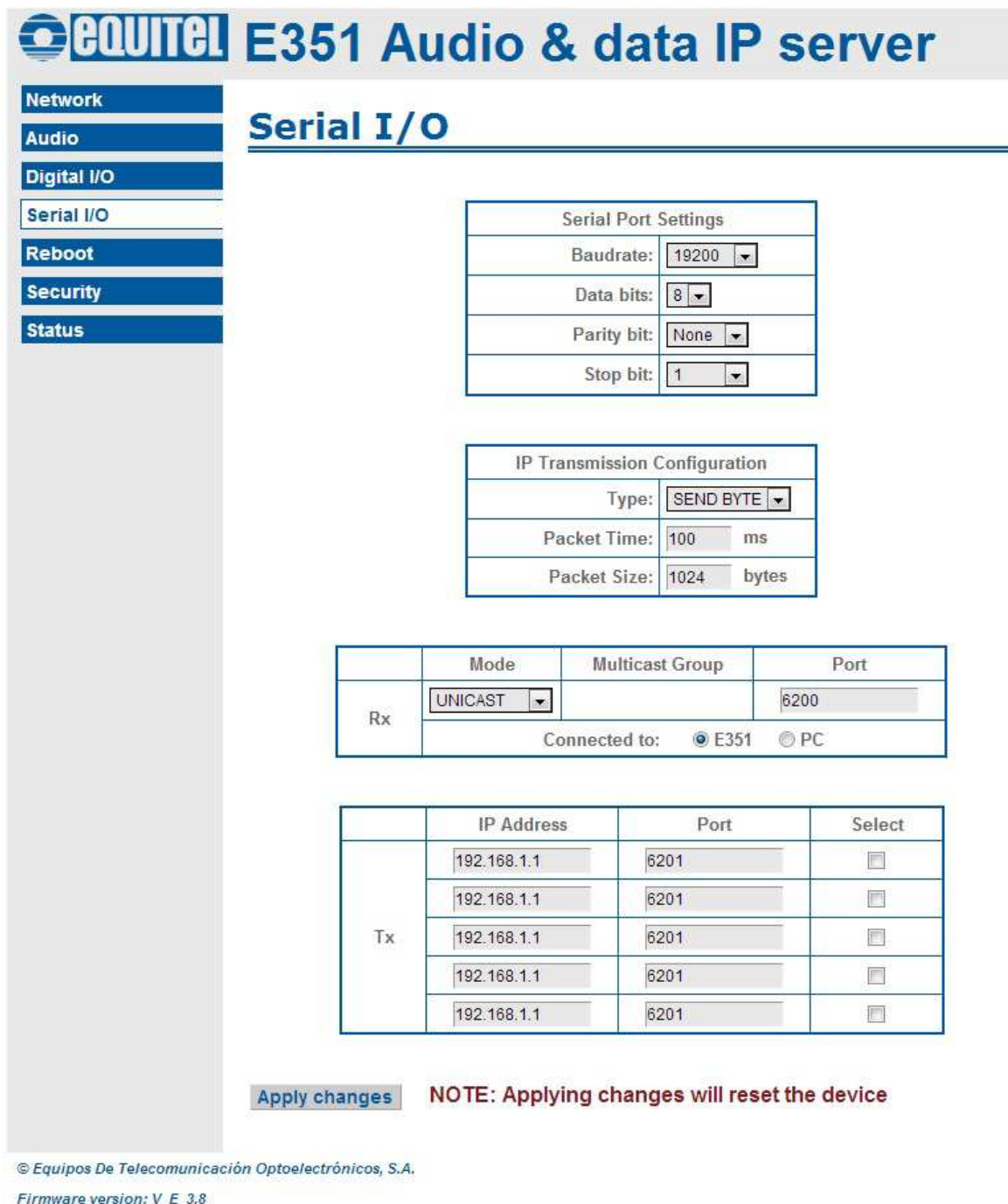
Port: Destination port of the contacts state packets.

Possible values: 0 ⋯ 65535

Select: Activates or deactivates sending packets to this destination.

3.4   Serial data configuration

In the serial data port configuration window we can configure the transmission mode and the data transmission and reception parameters.

Figure 19: Serial port configuration window

Serial port configuration:

Baudrate: Transmission rate (in bits per second).

Possible values: 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200.

Data bits: Number of data bits.

Possible values: 6 | 7 | 8.

ParityBits: Method of calculation of the parity bit.

Possible values: None | Odd | Even | Mark | Space.

StopBit: Number of stop bits.

Possible values: 1 | 2.

Transmission mode:

Type: Transmission mode used.

Possible values: SEND BYTE | BUFFERED

SEND BYTE: One IP packet is sent with each byte received from the serial port.

BUFFERED: The data received in the serial port are saved in a buffer and sent afterwards in a single IP packet when a specified size is reached (Packet Size) or when a determined time has passed by (Packet Time) without receiving data via the serial port.

Packet Size: Maximum size of the buffer in the "BUFFERED" mode

Possible values: 0 ··· 65535 (bytes)

Packet Time: Maximum time without receiving data via the serial port before sending a data packet in the "BUFFERED" mode

Possible values 0 ··· 65535 (milliseconds)

Reception parameters:

Mode: Selection of the desired reception mode, Unicast or Multicast. In case of choosing Multicast, it will be shown the box 'Multicast Group' in which we have to type the multicast group to which we want to subscribe.

Multicast Group: IP address of the multicast group to subscribe to:

Possible values: 224.0.0.0 ··· 239.255.255.255

Port: IP packets reception port:

Possible values: 0 ··· 65535

Connected to: Indicates the type of remote equipment connected to the reception port.

Possible values: E351 | PC

E351: The remote unit is another E351

PC: It is a PC in this case, and it is required the serial port input data to be transmitted through this port onwards to the PC. It is necessary for hyper terminal-type applications with bidirectional communication.

Transmission parameters:

There are 5 possible destinations to which the IP packets can be sent. For each one it is configured:

IP address: Packets destination IP address. It can be multicast or unicast.
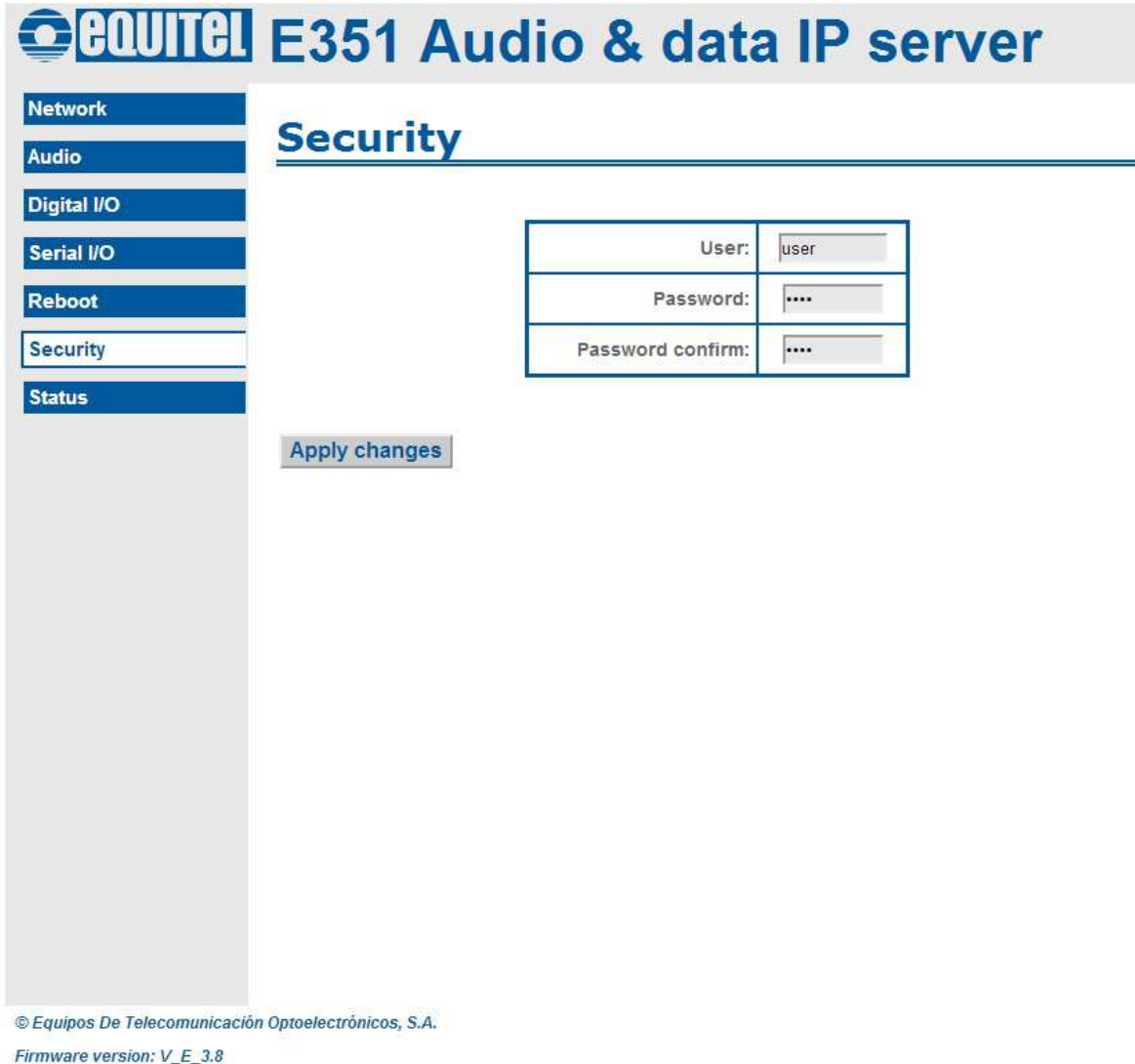
Port: IP packets destination port.

Possible values: 0 ··· 65535

Select: Activates or deactivates sending packets to this destination.

3.5 Credentials configuration

In the window 'Security', Figure 20**¡Error! No se encuentra el origen de la referencia.**, it is possible to change the user and access password:

Figure 190: Credential change window

3.6 Status

In the "Status" window it is shown the audio, serial data and contacts communication status. A Java applet initiates when accessing this page, so it will be necessary to install a Java virtual machine. Should it not be installed, the explorer will inform you and will give the option of installing it. It will also ask for a user name and a password which are the same as the ones for accessing the web.

In the lower part of the window there is a led accompanied by a text indicating if the connection with the unit has been correct or not. If it is good, it flashes in a green color and appears the text 'Status read successfully'. If there are any connection errors, the led is red and the text 'Error reading status' can be read.

In each one of the tabs it is indicated, just for information, the reception and transmission sockets status, as well as the number of packets received or transmitted. The information shown in these tabs is periodically updated. This time can be configured via Telnet.

3.6.1. Audio status:

The audio tab, Figure 21,shows the audio communication status.

In the reception part it is shown the status and the number of received packets for each one of the 5 audio streams that can be received. The possible states are as follows:

- READY: The socket is ready to receive audio.

- RECEIVING: Audio packets are being received from the socket

- PLAYING: The audio stream received in this socket is being sent to the analogue audio output to be played. In this case there is also an indicating led informing if the receiving audio is correct (green) or if it has a different quality than the one configured in this equipment (red), in whose case it will not be played.

In the transmission side it is also shown the status and number of transmitted packets for each one of the 5 transmission destinations. In this case the possible values are:

- SENDING: Audio is being transmitted.

- READY: The socket is ready to transmit when the activation signal (contact or audio level) is activated.

- OFF: There is no audio transmission.
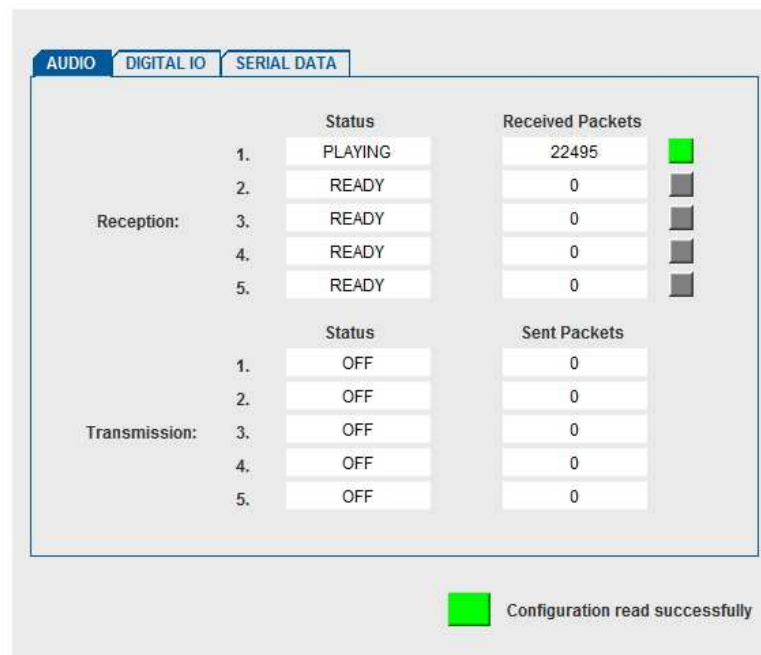
Figure 201: Audio status

3.6.2. Digital I/O Status:

The tab Digital I/O, Figure 21, shows the contacts communication status.

In the reception part we can see their status and the number of received packets. The possible status are:

- READY: In the case of unicast reception (TCP), the socket is connected and ready to receive packets. In the case of multicast reception (UDP), the socket is ready for reception.

- OFF: In the case of unicast reception (TCP), the socket is not connected.

In the transmission side we also see the status and number of transmitted packets for each one of the 5 transmission destinations. In this case the possible statUses are:

- ON: The transmission to this destination is enabled. Furthermore, in the case of transmnission to a unicast address, the socket is connected.

- OFF: The transmission to this destination is disabled or the in case of transmissions to a unicast address, the socket is disconnected.

Furthermore, it is shown the input contacts status (IN) and the output ones (OUT). '1' stands for closed contact and '0' means that it is open.
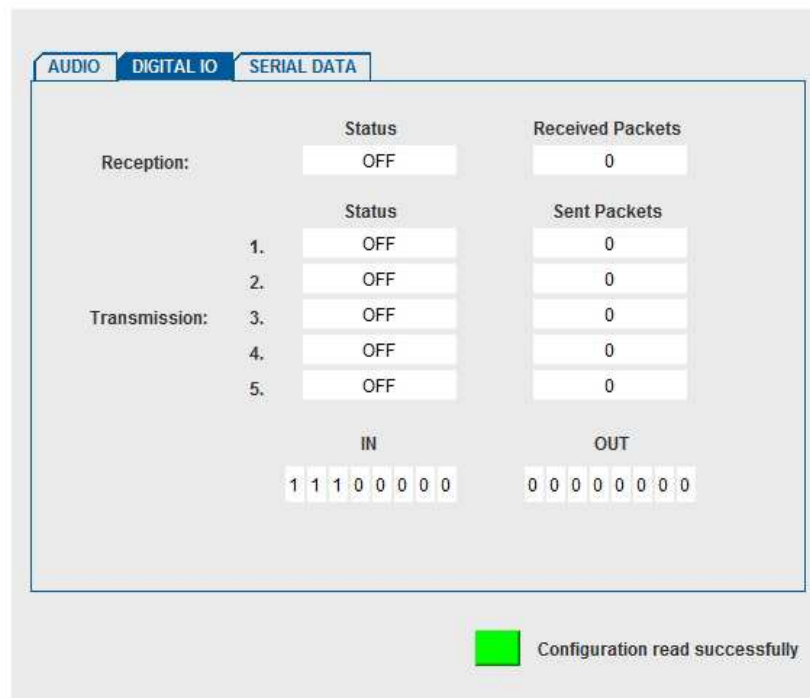
Figure 21: Digital I/O Status

3.6.3. Serial Data Status:

The serial Data tab, Figure 22 , shows the serial data communication status.
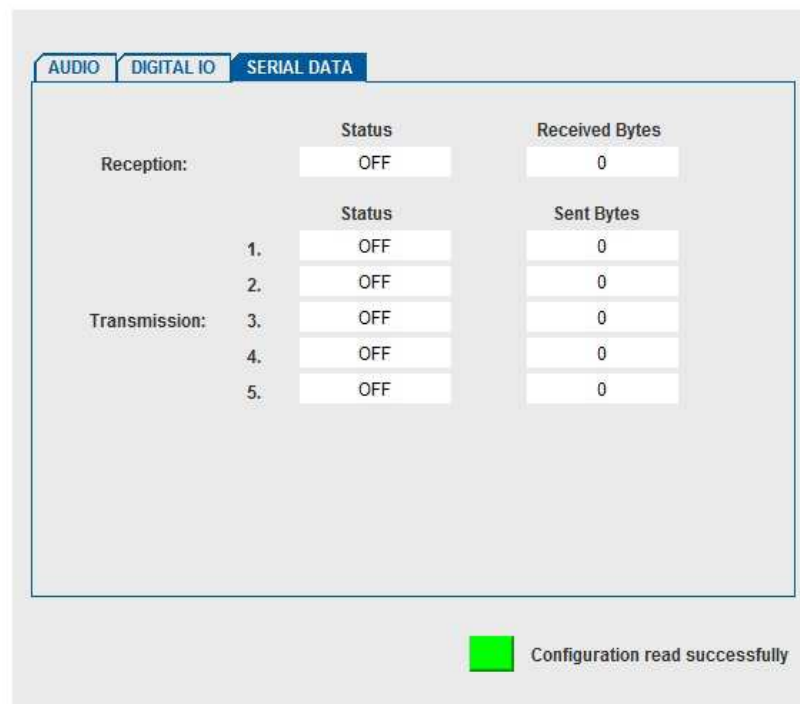
In the reception part it is shown its status and the number of received packets. The possible states are:

- READY: In the case of unicast reception (TCP), the socket is connected and ready to receive packets. In the case of multicast reception (UDP), the socket is ready for reception.

- OFF: In the case of unicast reception (TCP), the socket is not connected.

In the transmission side it is also shown the status and number of transmitted packets to each one of the 5 transmission destinations. In this case, the possible states are:

- ON: The audio transmission to this destination is enabled. In the case of transmission to a unicast address, the socket is connected.

- OFF: The transmission to this destination is disabled, or in case of transmission to a unicast address, the socket is disconnected.

Figure 22: Serial Data Status

Chapter 4   Configuration using Telnet

As an alternative to the configuration via the Web interface we saw in Chapter 3, it is possible to Use a simple text interface (command line) by using the Telnet server (port 23).

You only need to connect Telnet[1] client to the unit IP address.

> The IP factory default configuration is: 192.168.1.1

When opening the Telnet connection with E351, we will see the following figure, which indicates the firmware version and asks for a User and password to access to the configuration:

> By default.   User: User
> Password: 1234

Figure 23: Telnet connection

Once the prompt appears we can begin introducing commands.

The commands are typed with the keyboard and we click 'ENTER' to indicate that we have finished.

There are three types of commands:
- Set commands, to modify the values of the configuration parameters.
- Get commands, to show the current values of the parameters.
- Help commands, such as 'Help' and 'Viewconfig'.

These are the rules to follow when introducing the commands:
- When one or more arguments are to be introduced after the command, a blank space must be left between them:
  - Command<space><argument 1><space><argument 2>…
- Commands can be typed either in uppercase or lowercase.
- It is possible to type the whole command or just the abbreviated equivalent.

In order to close the session, Use the 'QUIT' command.

---

[1] Windows professional versions incorporate a native Telnet client which is executed from the operative system commands interface with the command **TELNET xxx.xxx.xxx.xxx**, (x stand for the IP address of the unit we wish to connect)

Important: Should we need to save the changes in the parameters as a permanent configuration, it will be necessary to save them in the Flash memory by using the command SAVECONFIG. Otherwise, the new configuration will be lost. We must reboot the system after saving the configuration with the REBOOT command so that the changes may come into effect. The modifications of the Ethernet network parameters are automatically saved in the memory. Therefore, it will not be necessary to save them by using the command SAVECONFIG but it will be required to reboot the system.

4.1 Available commands

Commands are sorted by function:

SYSTEM	Commands related with the system management (rebooting the unit, saving configuration in memory, etc)
GENERAL	Commands that provide general information (version, etc.)
NET	Commands related with the Ethernet network
WEB	Commands related with the web configuration
AUDIO	Commands for the audio parameters configuration.
DATA	Commands for the serial data parameters configuration.
CONTACT	Commands for the contacts parameters configuration.
STATUS	Commands for consulting the unit status

After using a command there is always an answering message informing about the result. It can be:

- 'Parameters applied successfully'. The parameters have been correctly modified. Should it be necessary, there is next a message indicating if we have to save the configuration or rebooting the unit.

- 'Error, correct syntax is:'. The command has not been correctly typed, there are some parameters missing or the value or format of any of them is wrong. Next, it is shown the correct syntax.

In the following paragraphs there is a list of the commands available for the E351 configuration.

For each one it is shown: the complete command, its abbreviate form, the possible parameters, its description and the default value.

4.1.1. Help and status query commands

'Help': shows information about the available commands grouped by functionality. If it is entered without any parameter, it shows a list of all the functionalities. If you enter the command followed by the desired functionality, the available commands in that group are shown. For instance, the command *> Help AUDIO* shows a list of all available commands for the audio configuration.

'Viewconfig': shows the current configuration of a functional block. Like the 'Help' command, if it is entered without any parameter, a list of available functional groups is shown. If you enter the command followed by any of these groups, it shows the configuration data related to that group. For instance, *> Viewconfig AUDIO* will show the current configuration parameters related to audio.

4.1.1.1. HELP

Use:	Shows the available commands for the desired functional group and a brief description.
Parameters:	SYSTEM | GENERAL | NET | WEB | AUDIO | DATA | CONTACT STATUS |
Notes:	SYSTEM, commands related to the system management
	GENERAL, for general parameters.
	NET, for the network parameters configuration.
	WEB, commands for the web parameters configuration
	AUDIO, audio configuration commands
	DATA, for serial data configuration.
	CONTACT, for parallel (i.e. contacts) configuration.
	STATUS, commands to access to information about the unit status.

4.1.1.2. VIEWCONFIG

Use:	Shows the current configuration.
Abbreviation:	VWCF
Parameters:	GENERAL | NET | WEB | AUDIO | DATA | CONTACT |STATUS
Notes:	GENERAL, current configuration of the general parameters.
	NET, it shows the current network parameters configuration.
	WEB, current web parameters configuration
	AUDIO, shows the current audio parameters configuration.
	DATA, shows the current serial data parameters configuration.
	CONTACTS, shows the current contacts parameters configuration.
	STATUS: Information about the current state of the equipment

4.1.2. System configuration

The following commands are for system configuration.

4.1.2.1. ResetFactory

Use:	Restores the factory configuration parameters.
Abbreviation:	RSTF
Parameters:	1
Notes:	You must enter a "1" after the command to make sure that has been correctly written

4.1.2.2. SaveConfig

Use:	Saves the current configuration in the flash memory
Abbreviation:	SCFG
Parameters:	1
Notes:	You must enter a "1" after the command to make sure that has been correctly written. This command must be used every time one of several variables are modified.

4.1.2.3. Reboot

Use:	It reboots the unit
Abbreviation:	RBOT
Parameters:	(None)
Notes:	Reboots the unit reloading the firmware from the flash and reconfiguring all the system with configuration values stored in the flash

4.1.2.4. QUIT

Use:	Ends the telnet session
Abbreviation:	(None)
Parameters:	(None)
Notes	

4.1.3. General configuration

4.1.3.1. SetName

Use:	Modifies the identifying name given to the module E351.
Abbreviation:	SNAM
Parameters:	Name
Notes:	The name must be typed as a characters chain, no more thant 10 characters long.
Default value:	E351

4.1.3.2. GetName

Use:	Shows the module name
Abbreviation	GNAM
Parameters:	No
Notes:	

4.1.3.3. GetFirmwareVersion

Use	Gets the current DSP Firmware version.
Abbreviation:	GFWV
Parameters:	No
Notes:	The version is shown as V_E_X.X.

4.1.3.4. GetCPLDVersion

Use:	Gets the current CPLD Firmware version
Abbreviation:	GCPV
Parameters:	No
Notes:	The version is shown as VX.X.

4.1.3.5. GetHardwareVersion

Use:	Gets the hardware version
Abbreviation:	GHWV
Parameters:	No
Notes:	The version is shown as Vx, where x stands for the version number

4.1.3.1.   SetKeepaliveTime

Use:	Modifies the time configured for sending the keepalive packets.
Abbreviation:	SKAT
Parameters:	Idle, Interval,| MaxIdle
Notes:	Idle: Time without connection activity before sending a Keepalive' packet. Interval; if there is no answer to a 'Keepalive' packet, the unit resends it again after this interval. MaxIdle: Once a 'Keepalive' packet is sent, this is the maximum time accepted without receiving an answer. The connection is closed after this time.
Default value:	All the times are measured in miliseconds Between 100 and 65535 ms. 10000, 5000, 60000.

4.1.3.2. GetKeepaliveTime

Use:	Sends back the times configured for sending the 'Keepalive packets'
Abbreviation:	GKAT
Parameters:	No
Notes:	Send back; Idle, Interval, MaxIdle The values that are sent back are times in miliseconds.

4.1.4. Network configuration

E351 uses an Ethernet connection for the audio, serial data and contacts transmission, for the web server and management software connection, and for the configuration via Telnet.

Special caution must be taken when changing the network parameters configuration.

Should a mistake occur while changing the parameters, the connection might not be recovered. For example, if we change the IP address and there is a typing mistake, E351 will reboot with an unknown IP address making it impossible the communication with it. In this case, the only solution is to recover the initial configuration as explained in the point 0

Everytime the network configuration is changed, the unit must be restarted.

4.1.4.1. GetMACAddress

Use:	Shows the MAC address of the unit.
Abbreviation:	GMAC
Parameters:	(None)
Notes:	MAC address is shown in hexadecimal format : XX-XX-XX-XX-XX-XX. The MAC address is exclusive for each E351

4.1.4.2. SetIpAddress

Use:	Asigns a new IP address.
Abbreviation:	SIPA
Parameters:	IP address
Notes:	The IP address must be entered as X.X.X.X, where X stands for any value between 0 and 255.

The unit must be reset after changing the IP address.
After changing the IP address, when rebooting the unit the Telnet session will be closed and the next one must be open with a new IP address.

Default value: 192.168.1.1

4.1.4.3. GetIpAddress

Use:	Shows the IP address of the unit.
Abbreviation:	GIPA
Parameters:	(None)
Notes:	The IP address is shown as X.X.X.X.

4.1.4.4. SetMask

Use:	Sets the subnet mask.
Abbreviation:	SMSK
Parameters:	Subnet mask
Notes:	The subnet mask must be entered as X.X.X.X, where X stands for any value between 0 and 255. The unit must be reset after changing the subnet mask.
Default value:	255.255.255.0

4.1.4.5. GetMask

Use:	Shows the subnet mask of the unit.
Abbreviation:	GMSK
Parameters:	(None)
Notes:	The subnet mask is shown in the format X.X.X.X.

4.1.4.6. SetGateway

Use:	Sets the gateway IP address.
Abbreviation:	SGTW
Parameters:	Gateway IP
Notes:	The gateway must be entered as X.X.X.X, where X stands for any value between 0 and 255. The unit must be reset after changing the gateway IP.
Default value:	0.0.0.0 (Not used)

4.1.4.7. GetGateway

Use:	Shows the gateway IP address.
Abbreviation:	GGTW
Parameters:	(None)
Notes:	The gateway address is shown in the format X.X.X.X

4.1.5. Web parameters configuration

4.1.5.1. SetWebUser

Use:	Assigns a new configuration access user (Web and Telnet)
Abbreviation:	SWUS
Parameters:	User, Password
Notes:	The user must be entered as characters sequence, with no more than 8 characters. It is case-sensitive.
Password	Configuration access password.
Default value:	User

4.1.5.2. SetWebPassword

Use:	Assigns a new configuration access password (Web and Telnet).
Abbreviation:	SWPW
Parameters:	New password, Old password
Notes:	The password must be entered as characters sequency, with no more than 7 characters. It is case-sensitive Old password is the current password.
Default value:	1234

4.1.5.3. SetWebRefreshTime

Use:	Modifies the applet java refresh time of the web status section.
Abbreviation:	SWRT
Parameters:	Time
Notes:	Time in miliseconds.
Default value	1000

4.1.5.4. GetWebRefreshTime

Use:	Shows the java applet refresh time value in the web status window.
Abbreviation:	SWRT
Parameters:	Time
Notes:	Time in miliseconds.

4.1.6. Audio configuration

4.1.6.1. SetAudioQuality

Use:	Modifies the audio quality.
Abbreviation:	SAUQ
Parameters:	1 | 2 | 3
Notes:	1 -> PCMA audio, 8 KHz, 8 bits/sample (64 Kbps) 2 -> PCMA audio, 32 KHz, 16 bits/sample (512 Kbps) 3 -> PCMA audio, 48 KHz, 16 bits/sample (768 Kbps)
Default value:	1

4.1.6.2. GetAudioQuality

Use:	Shows the audio quality.
Abbreviation:	GAUQ
Parameters:	(None)
Notes:	The audio quality is shown as 1, 2 or 3, with the same meaning as in the *SetAudioQuality* command: 1 -> PCMA audio, 8 KHz, 8 bits/sample (64 Kbps) 2 -> PCMA audio, 32 KHz, 16 bits/sample (512 Kbps) 3 -> PCMA audio, 48 KHz, 16 bits/sample (768 Kbps)

4.1.6.3. SetAudioRx

Use:	Modifies the audio reception parameters.
Abbreviation:	SARX
Parameters:	Rx stream number, Multicast, LocalPort, IPMulticast
Notes:	Rx stream number: 1 – 5 Reception stream number to configure. It must be selected one out of 5 numbers. 1 corresponds to the highest priority and 5 to the lowest.

Multicast: 0 | 1
0 -> reception is UNICAST
1 -> reception is MULTICAST

LocalPORT: between 0 – 65534. UDP port for the RTP audio reception. It must be an even number and the reception ports must not be duplicated.

IPMultcast: IP address of the multicast group to subscribe to. The multicast IP addresses are those within the range 224.0.0.0 – 239.255.255.255 but some are reserved for special tasks. Therefore, it is advisable to consult the norm to check which ones can be used

Should unicast mode be selected, we have to enter only the port numer. If multicast, port and multicast IP address..

Default value:	Rx 1 - Mode = UNICAST, Port = 6000 Rx 2 - Mode = UNICAST, Port = 6002 Rx 3 - Mode = UNICAST, Port = 6004 Rx 4 - Mode = UNICAST, Port = 6006 Rx 5 - Mode = UNICAST, Port = 6008

4.1.6.4. GetAudioRx

Use:	Shows the audio reception parameters.
Abbreviation:	GARX
Parameters:	Reception stream number (Optional)
Notes:	It shows the reception mode (unicast, multicast) and the UDP reception port for the selected stream. In case of not introducing the stream number, it shows the parameters of stream 1 (the one with the highest priority).

0 →UNICAST or 1 →MULTICAST
In case of multicast, it also shows the multicast address

4.1.6.5. SetAudioRxBuffer

Use:	Modifies the reception buffer size value
Abbreviation:	SARB
Parameters:	Size
Notes:	Size is the number of packets that the reception buffer is capable of storing. It must be an even number between 2 and 254 packets.
Default value:	8

4.1.6.6. GetAudioRxBuffer

Use:	Shows the reception buffer size
Abbreviation:	GARB
Parameters:	None
Notes:	The value is the number of packets the buffer can store.

4.1.6.7. SetAudioTx

Use:	Modifies the audio transmission parameters for the selected destination.
Abbreviation:	SATX
Parameters:	Target number, Target IP, Target Port, Active.
Notes:	Target number: Selects one of the five possible destinations of the audio stream. Possible values: 1 to 5
	Target IP: IP address of the target device, with the format X.X.X.X, where X stands for a number between 0 and 255. Note that this address may be either unicast or multicast.
	Target port: Port where RTP audio is sent. It must be an even number in the 0 – 65535 range.
	Activation: 0 | 1 | 2 | 3 | ... | 9 | 10 Audio enabling mode to the destination 0 -> OFF 1 -> ON 2 -> By input audio level, when a configured threshold is exceeded.. 3 -> By input contact 1 4 -> By input contact 2 .... 9 -> By input contact 7 10 -> By input contact 8
Default value:	Target 1→ IP:192.168.1.1 Port: 6002 Activation: OFF Target 2→ IP:192.168.1.1 Port: 6002 Activation: OFF Target 3→ IP:192.168.1.1 Port: 6002 Activation: OFF Target 4→ IP:192.168.1.1 Port: 6002 Activation: OFF Target 5→ IP:192.168.1.1 Port: 6002 Activation: OFF

4.1.6.8. GetAudioTx

Use:	Shows the audio emission parameters for the selected target.
Abbreviation:	GATX
Parameters:	Target number.
Notes:	It shows the IP address and port configured for the selected target. It also shows the activation mode.

4.1.6.9. SetAudioTxActive

Use:	Enables or disables the audio transmission for the selected target.
Abbreviation:	SATA
Parameters:	Target number, Active
Notes:	Target number: Selects one of the five possible audio stream destinations. Possible values: 1 to 5

Active: 0 | 1
0 → Disables sending audio to this destination
1 → Enables sending audio to this destination.

Default value:	Disabled.

4.1.7. Serial data port configuration

4.1.7.1. SetDataPort

Use:	Sets the serial data port configuration.
Abbreviation:	SDPT
Parameters:	Baudrate, DataBits, ParityBits, StopBit
Notes:	Baudrate: 1200	2400	4800	9600	19200	38400	57600	115200.

DataBits: 5 | 6 | 7 | 8.

ParityBits: 0 | 1 | 2 | 3 | 4.
0 -> No parity, 1 -> Odd parity, 2 -> Even parity,
3 -> Mark, 4 -> Space.

StopBit: 1 | 1.5 | 2.

Default value:	19200, 8, 0, 1.

4.1.7.2. GetDataPort

Use:	Shows the serial data port configuration.
Abbreviation:	GDPT
Parameters:	(None)
Notes:	It shows: Baudrate, DataBits, ParityBits, StopBit

4.1.7.3. SetDataMode

Use:	Modifies the serial data transmission mode.
Abbreviation:	SDMD
Parameters:	Mode, PacketSize, PacketTimeOut.

Notes:

Mode: 0 | 1

0 -> Data entered from serial port is stored in an internal buffer. The buffer is sent in an IP packet when the amount of data reaches PacketSize or when PacketTimeOut milliseconds have passed from last byte.

1 -> One IP packet is sent for each byte entering through the serial port.

PacketSize: Maximum buffer size.

PacketTimeOut: Waiting time without receiving data from the serial port before sending a packet

If mode 1 is configured, parameters PacketSize and PacketTimeOut are not needed.

Default value: Mode 1

4.1.7.4. GetDataMode

Use:	Shows the IP transmission mode for the serial data port.
Abbreviation:	GDMD
Parameters:	(None)

Notes:

It shows: Mode, PacketSize and PacketTimeOut
Mode: 0 | 1 .
0 -> The data received from the serial port are stored in a buffer.
1 -> One packet is sent when a byte is received from the serial port.

Packet size: Buffer size.

PacketTimeOut: Waiting time without receiving data from the serial port before sending a packet

En caso de transmitir en el Modo 1, no se devuelven los valores de TamañoPaquete y TiempoPaquete.

4.1.7.5. SetDataRx

Use:	Modifies the serial data port reception parameters.
Abbreviation:	SDRX
Parameters:	Multicast, LocalPort, IPMulticast

Notes:

Multicast: 0 | 1
0 -> UNICAST mode
1 -> MULTICAST mode

LocalPort: It is the UDP port for serial data reception. It must be a number within the range 0 - 65535

IPMulticast: IP address of the multicast group to subscribe to. Multicast IP addresses are those within the range 224.0.0.0 – 239.255.255.255 but some are

reserved for specific tasks Therefore, special care must be taken when choosing the appropriate address.

If you select unicast mode, only the local port number is needed. If multicast, it is required the number port and multicast IP address.

Default value: UNICAST | 6200 |

4.1.7.6. GetDataRx

Use: Shows the reception parameters for the serial data port.

Abbreviation: GDRX

Parameters: (None)

Notes: It shows the reception mode (unicast or multicast) and the UDP reception port

0 → UNICAST or 1→ MULTICAST
In the case of multicast, it also shows the multicast group address.

4.1.7.7. SetDataClientMode

Use: Modifies the parameter indicating the remote unit connected to the reception port.

Abbreviation: SDCM

Parameters: Mode

Notes: Mode: E351 | PC
E351→ The remote unit connected is another E351
PC→ The remot unit is a PC, and it is required the serial port input data to be transmitted through this port onwards to the PC. It is necessary for hyper terminal type applications with bidirectional communication

Default value: E351
.

4.1.7.8. GetDataClientMode

Use: Shows the parameter value indicating the remote unit connected to the reception port.

Abbreviation: GDCM

Parameters: None

4.1.7.9. SetDataTx

Use: Modifies the serial data transmission parameters.

Abbreviation: SDTX

Parameters: Target number, Target IP, Target Port, Active.

Notes: Target number: Selects one of the five possible destinations of the serial data IP stream. Possible values: 1 to 5

Target IP: IP address of the target device, with the format X.X.X.X, where X stands for a number between 0 and 255. Note that this address may be either unicast or multicast.

Target port: Port where the serial data must be sent. It must be a number between 0 and 65535.

Active: Enables (1) or disables (0) the serial data transmission to the selected target. Values: 0 | 1

Default value: Target 1→ IP:192.168.1.70   Port: 6201   Active: No
Target 2→ IP:192.168.1.71   Port: 6201   Active: No
Target 3→ IP:192.168.1.72   Port: 6201   Active: No
Target 4→ IP:192.168.1.73   Port: 6201   Active: No
Target 5→ IP:192.168.1.74   Port: 6201   Active: No

4.1.7.10. GetDataTx

Use: Shows the serial data transmission parameters for the selected target.

Abbreviation: GDTX

Parameters: Target number.

Notes: It shows the IP address (with the format X.X.X.X), destination port and informs whether it is active or not.

4.1.7.11. SetDataTxActive

Use: Enables or disables the serial data transmission

Abbreviation: SDTA

Parameters: Target number, Active

Notes: Target number: Selects one of the five possibly destinations of the serial data IP stream. Possible values: 1 to 5

Active: Enables (1) or disables (0) the stream emission for the selected target. Possible values: 0 | 1

Default value: DISABLED

4.1.8. Contacts configuration

4.1.8.1. SetContMode

Use: Modifies the contacts transmission mode.

Abbreviation: SCMD

Parameters: Mode, Period, MessageType.

Notes: Mode: 1 | 2 | 3

1 -> Periodic: State is sent at a fixed rate
2 -> On status change: Status is sent only when an input changes
3 -> On demand: Status is sent as a response to another device
Period: Regularity with which the contact packets are sent in the case of Periodic transmission.
MessageType: 0 | 1
0 -> One message contains the 8 input values.
1 -> One message is sent for each one of the 8 inputs.

Default value: Mode: Periodic, Period: 1000, Type of message: 0

4.1.8.2. GetContMode

Use:	Shows the contacts reception parameters.
Abbreviation:	GCMD
Parameters:	(None)
Notes:	It shows: Mode, Period, Type of message. If the transmission is not periodic, it does not show the period value.

4.1.8.3. SetContRx

Use:	Modifies the contacts receiving parameters.	
Abbreviation:	SCRX	
Parameters:	Multicast, LocalPort, MulticastIP	
Notes:	Multicast:	0 | 1 0 -> UNICAST mode 1 -> MULTICAST mode
	LocalPort:	It is the local UDP port used to receive packets for the dry contacts output. Must be a number in the range 0 - 65535
	MulticastIP:	IP address of the multicast group to subscribe to. Multicast IP addresses are those in the range 224.0.0.0 – 239.255.255.255, but some of them are reserved for special traffic in the network. So, special care must be taken when choosing the appropriate address
	If you select unicast mode, only the local port number is needed. If multicast, the port number and IP multicast address.	
Default value:	UNICAST | 6200	

4.1.8.4. GetContRx

Use:	It shows the contacts receiving parameters.
Abbreviation:	GCRX
Parameters:	(None)
Notes:	It shows the reception type: unicast or multicast and the UDP reception port.

4.1.8.5. SetContTx

Use:	It modifies the dry contact inputs IP transmission parameters.	
Abbreviation:	SCTX	
Parameters:	Target number, Target IP, Target Port, Active.	
Notes:	Target number:	Selects one of the dry contacts inputs stream five possible destinations. Possible values: 1 to 5
	Target IP:	IP address of the target device, with the format X.X.X.X, where X stands for a number between 0 and 255. Note that this address may be either unicast or multicast.

	Target port:	Port where data must be sent. It must be a number in the 0 – 65535 range.
	Active:	Enables (1) or disables (0) the contacts transmission over IP to the selected target. Possible values: 0 | 1

Default value:	Target 1→ IP:192.168.1.70 Port: 6101 Active: No
	Target 2→ IP:192.168.1.71 Port: 6101 Active: No
	Target 3→ IP:192.168.1.72 Port: 6101 Active: No
	Target 4→ IP:192.168.1.73 Port: 6101 Active: No
	Target 5→ IP:192.168.1.74 Port: 6101 Active: No

4.1.8.6. GetContTx

Use:	Shows the contacts transmission parameters for the selected target.
Abbreviation:	GCTX
Parameters:	Target number.
Notes:	It shows the IP address, with the format X.X.X.X., the destination port and informs whether it is active or not.

4.1.8.7. SetContTxActive

Use:	Enables or disables the contacts transmission to the selected target
Abbreviation:	SCTA
Parameters:	Target number, Active
Notes:	Target number: Selects one of the five possibly destinations of the dry contact inputs IP stream. Possible values: 1 to 5
	Active: Enables (1) or disables (0) the stream transmission to the selected target. Possible values: 0 | 1
Default value:	DISABLED

Chapter 5   Maintenance

5.1   How to solve the more common failures

In the following table, you can find a list of the more common failures and some clues to try solving them.

Faillure	Causes and possible solutions
The unit does not turn on 'ON' LED does not flash	Check if the unit is correctly powered
'RUN' LED off	The internal firmware is not properly loaded. Reset the unit with the 'Reset' button or switching off /on the power supply
'ERR' LED blinking every 2 seconds	The audio quality selected in the unit and its peer is not the same.
'ERR' LED on and 'LINK' LED flashes	Reset the unit.
'LNK' LED does not light and ERR lights. No network	No Ethernet connection. Check if the network cable is correctly connected, and that it is connected to an Ethernet 100-BASE-T network. Confirm that the cable is appropriate for this connection (try to use a cross-over cable).
No audio output , or the output is saturated	Check that the output audio level indicator leds flash, which confirms the presence of input signal from the network. Check the audio input in the remote unit. Check if the remote unit is sending audio to the correct port. Check if the audio quality configuration is the same in both units.
No serial port communication	Check if the serial data cable is connected to the desired interface, and that it is correctly connected in both ends. Check if the cable is appropriate. Check if the sending and receiving ports configuration is correct. Check if the serial ports configuration is the same in the transmitting and receiving units.
No dry contact communication	Check if the connections are correctly made Check that the sending and receiving ports configuration is correct.

5.2   Firmware update

EQUITEL is continuously working to improve its products.

As a result of this process or to solve any bug or mistake, new firmware versions can be published. These may be uploaded in the device remotely by the User / installer so that the process can be as comfortable and easy as possible.

Should you need an update, EQUITEL will provide you the application 'E351 Firmware Updater', as well as the necessary documentation to make this update.

5.3   Factory default configuration restore

In case you need to restore the default configuration of the unit, you must press the RESET button **8** for, at least, 5 seconds.

Chapter 6   Technical data

6.1   Box

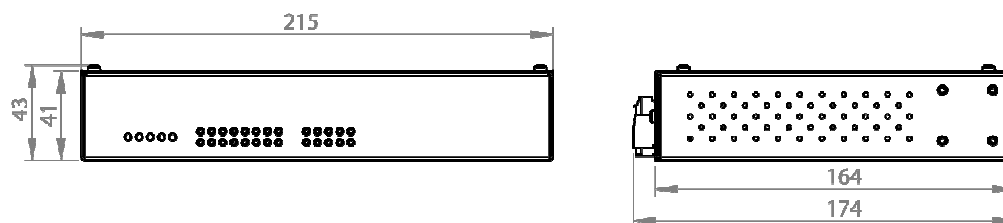The device has a metallic box with these dimensions:

Figure 24: External dimensions

6.2   Power supply

- DC voltage from 12 to 24 V
- Consumption: ≤ 5W

6.3   Audio

- Balanced audio input. 600Ω input impedance, for a line input up to. +10 dBu
- Balances audio output. Low impedance (33 Ω). The output level is the same to the input in the remote link: +10 dBu maximum.

6.4   Power supply connector

It is a two pole screw-in connector, with this pin-out:

Pin	Signal	Description
(Left)	GND	Ground (-)
(Right)	+VCC	Positive power supply (+)

6.5   Ethernet connector

It is a RJ-45 connector with two leds, with this pin-out:

Pin	Signal	Description
1	Tx+	Transmission +
2	Tx-	Transmission -
3	Rx+	Reception +
4,5		(Not used)
6	Rx-	Reception -
7,8		(Not used)

6.6 Audio connector

It is an eight pin screw-in connector. Pin number 1 is the leftmost one:

Pin		Signal	Description
1		H	HOT- input
2	IN	GND	Ground
3		C	COLD input
4		GND	Ground
5		GND	Ground
6		H	HOT output
7	OUT	GND	Ground
8		C	COLD ouput

6.7 Serial data port connector

It is an eight pin screw-in connector. Pin number 1 is the leftmost one:

Pin	Signal	Description
1	Rx	RS232 reception
2	Tx	RS232 transmission
3	Rx-B	RS422- RS485 reception, B terminal
4	Rx-A	RS422- RS485 reception, A terminal
5	Tx-B	RS422- RS485 transmission,B terminal
6	Tx-A	RS422- RS485 transmission,A terminal
7	Sel-485	RS485 selector
8	GND	Ground

6.8 Dry contacts output connector

It is a two row eight pin screw-in connector.

The output number 1 is the leftmost one, being one pole in the upper row and the other one in the lower row and so on.

6.9 Dry contacts input connector

It is a two row eight pin screw-in connector.

The input number 1 is the leftmost one, being one pole in the upper row and the other one in the lower row and so on.

Chapter 7   Installing options

The E351 may be installed in stand-alone way, in a 19" rack or with a DIN-rail.

7.1   Rack installation

EQUITEL can supply, on demand, assembly kits to install one or two units in a 19" rack, as shown in the figures:
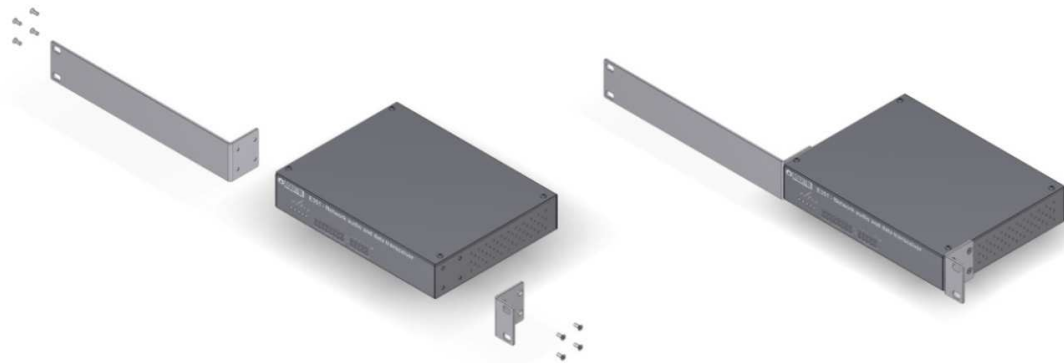

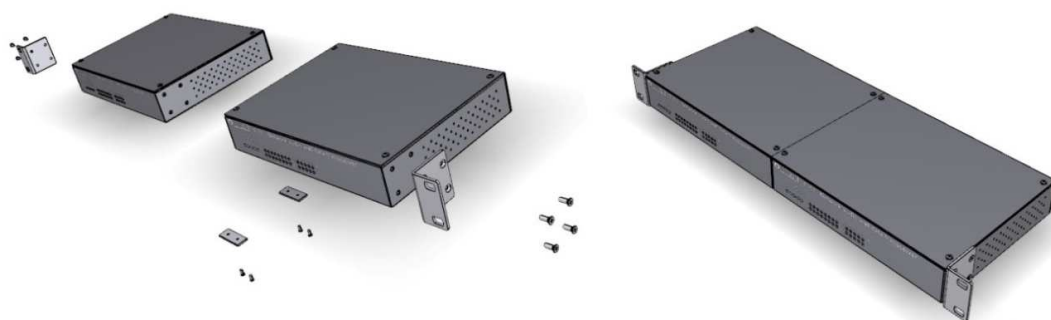**Figure 256: One unit 19" rack installation**

Figure 267: Two units rack installation

7.2   DIN rail installation
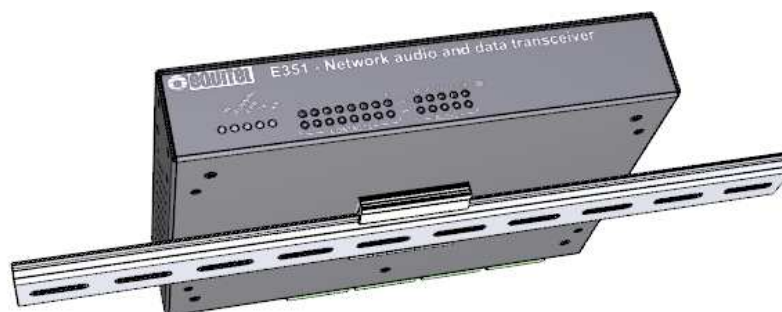
Optionally, there is a place holder for DIN rail as shown in next figure:

Figure 27.   DIN rail installation